A	B	C	D	E	F
Sequence Number	Primary Bit Stream (8B words)	10B Code Name	10B Code for Current RD−	10B Code for Current RD+	10B Code Selection Logic
1	000 00001	/D1.0/	011101 0100	100010 1011	10B Code selected to balance the running disparity of the encoded bit stream
2	000 00101	/D5.0/	101001 1011	101001 0100	10B Code selected to balance the running disparity of the encoded bit stream
3	000 11010	/D26.0/	010110 1011	010110 0100	10B Code selected to balance the running disparity of the encoded bit stream
4	000 01111	/D15.0/	010111 0100	101000 1011	10B Code selected to balance the running disparity of the encoded bit stream

FIG. 1
(PRIOR ART)

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A	B	C	D	E	F	G
Sequence Number	Primary Bit Stream (8B words)	10B Code Name	10B Code for Current RD−	10B Code for Current RD+	Additional Bit Stream	10B Code Selection Logic
1	000 00001	/D1.0/	011101 0100	100010 1011	0	10B Code selected to represent the bit of the additional bit stream
2	000 00101	/D5.0/	101001 1011	101001 0100		10B Code selected to balance the running disparity of the encoded bit stream
3	000 11010	/D26.0/	010110 1011	010110 0100	1	10B Code selected to represent the bit of the additional bit stream
4	000 01111	/D15.0/	010111 0100	101000 1011		10B Code selected to balance the running disparity of the encoded bit stream

FIG. 2

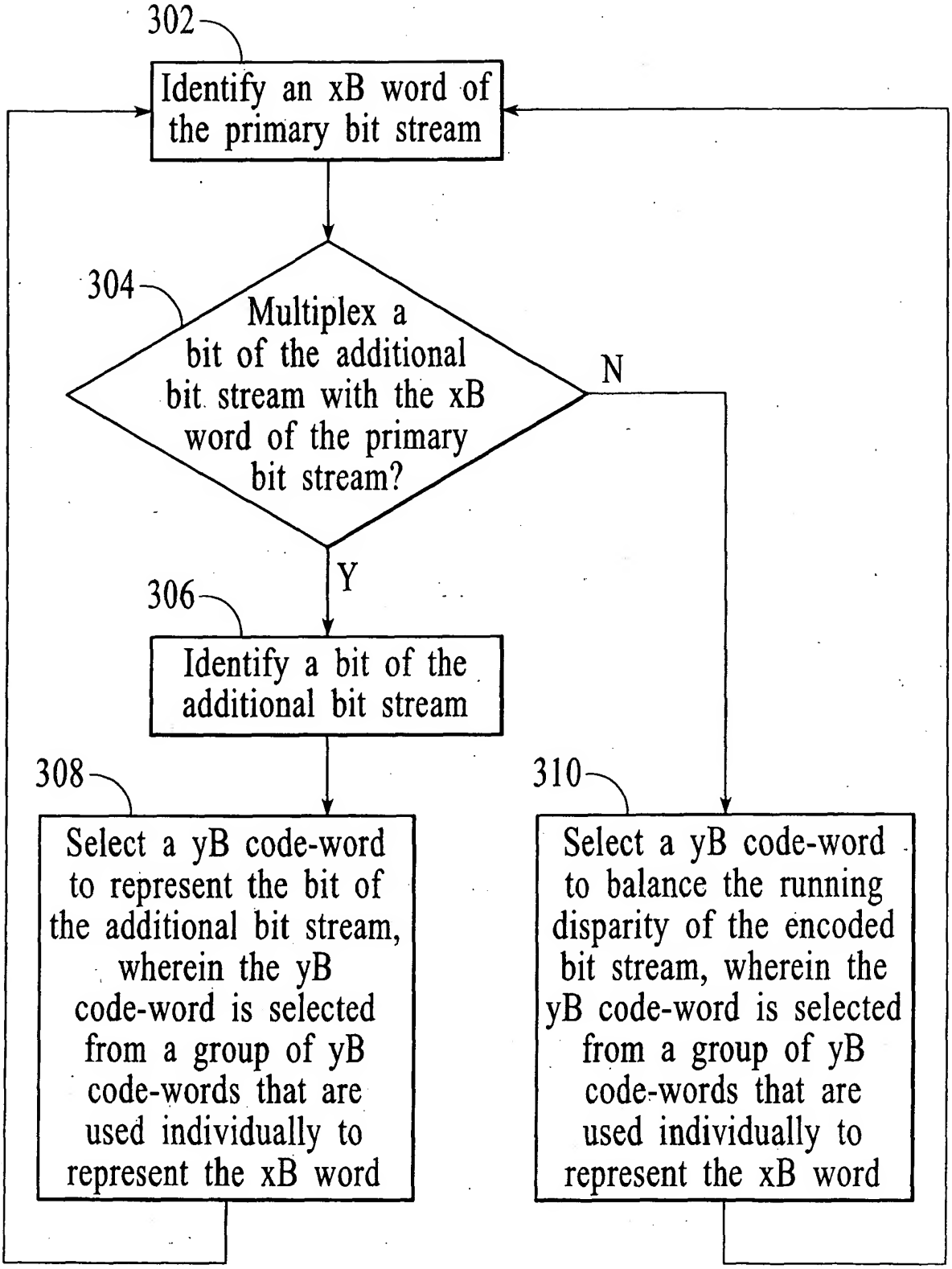

302
Identify an xB word of the primary bit stream
304
Multiplex a bit of the additional bit stream with the xB word of the primary bit stream?
N
Y
306
Identify a bit of the additional bit stream
308
Select a yB code-word to represent the bit of the additional bit stream, wherein the yB code-word is selected from a group of yB code-words that are used individually to represent the xB word
310
Select a yB code-word to balance the running disparity of the encoded bit stream, wherein the yB code-word is selected from a group of yB code-words that are used individually to represent the xB word

FIG. 3

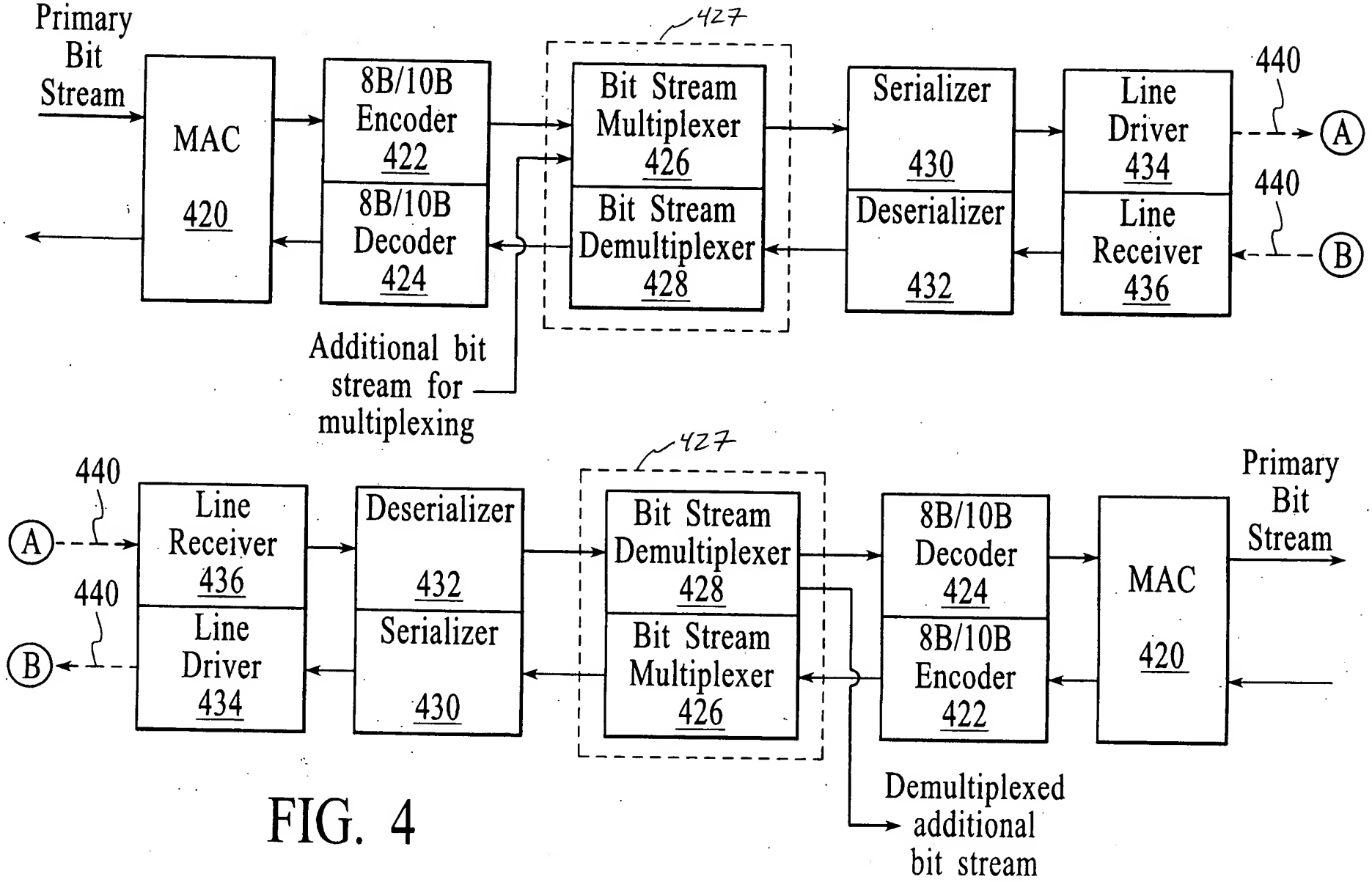
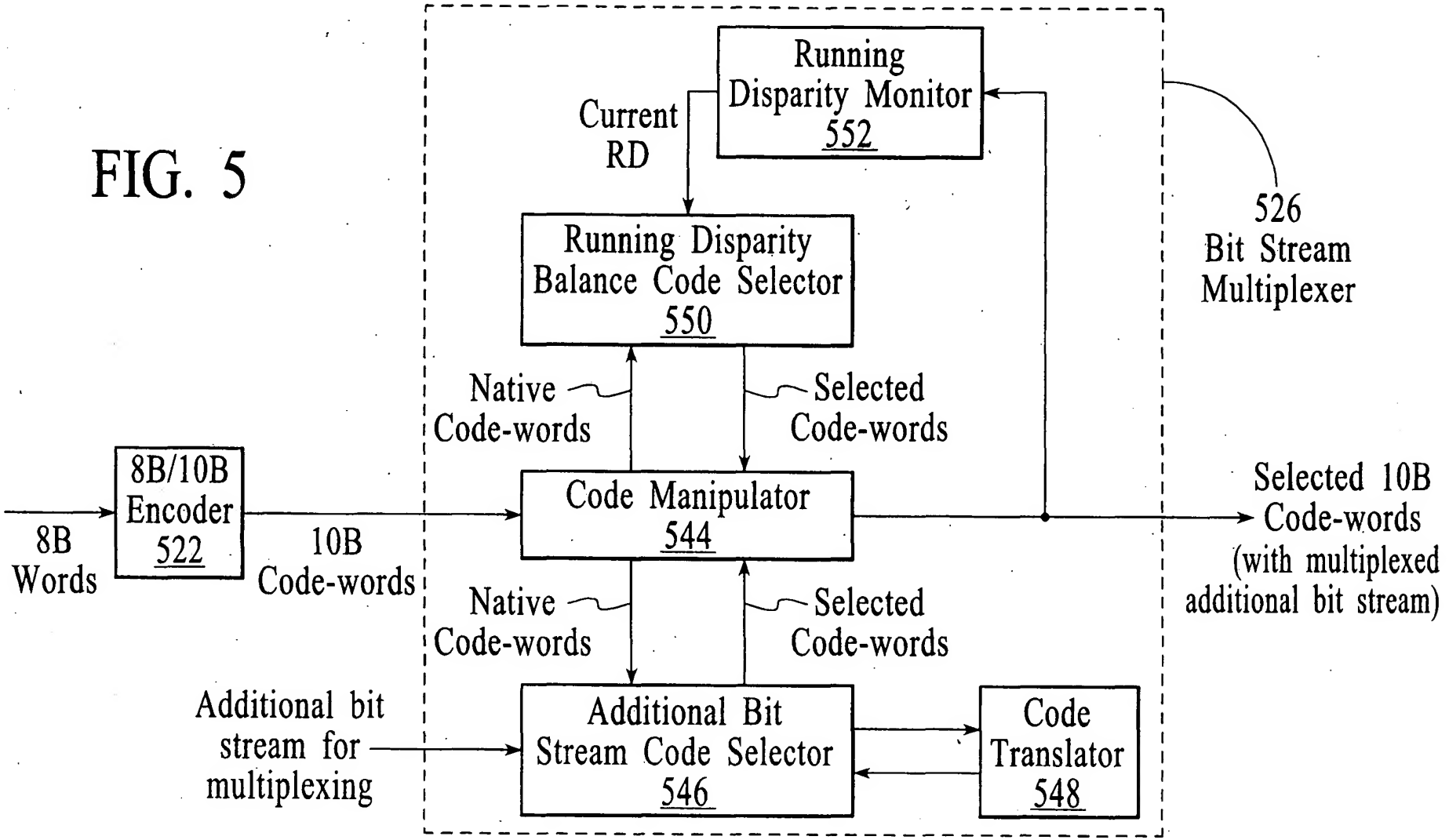

Primary Bit Stream
MAC 420
8B/10B Encoder 422
8B/10B Decoder 424
427
Bit Stream Multiplexer 426
Bit Stream Demultiplexer 428
Serializer 430
Deserializer 432
Line Driver 434
Line Receiver 436
440
A
B
Additional bit stream for multiplexing
Demultiplexed additional bit stream

FIG. 4

FIG. 5


Running
Disparity Monitor
552
Current
RD
526
Bit Stream
Multiplexer
Running Disparity
Balance Code Selector
550
Native
Code-words
Selected
Code-words
8B/10B
Encoder
522
8B
Words
10B
Code-words
Code Manipulator
544
Selected 10B
Code-words
(with multiplexed
additional bit stream)
Native
Code-words
Selected
Code-words
Additional bit
stream for
multiplexing
Additional Bit
Stream Code Selector
546
Code
Translator
548

TEK-004

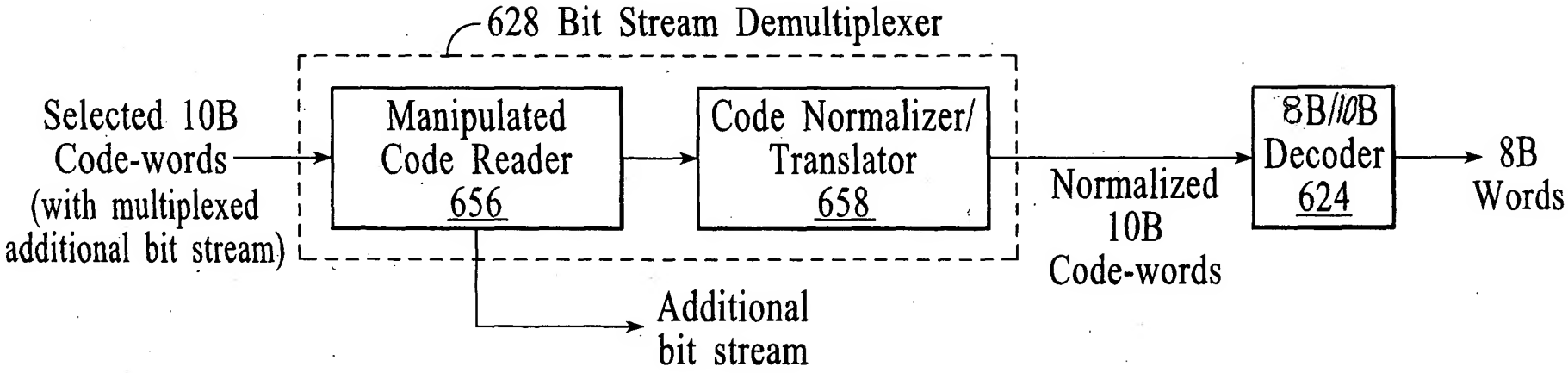

628 Bit Stream Demultiplexer
Selected 10B Code-words (with multiplexed additional bit stream)
Manipulated Code Reader 656
Code Normalizer/ Translator 658
Normalized 10B Code-words
8B/10B Decoder 624
8B Words
Additional bit stream

FIG. 6

A	B	C	D	$E_{(+)}$	$F_{(-)}$	G	H	I	J	K	L	M	N
	Data Bits (8B Codes)	Byte Value	10B Code Name	10B Code for Current RD− (DC Balance + or Neutral)	10B Code for Current RD+ (DC Balance − or Neutral)	New RD	RD Before Code Selection	Selected 10B Code	RD After Code Selection	Multiplexed Additional Bit Stream	RD Before Code Selection	Selected 10B Code	RD After Code Selection
1	000 00001	01	/D1.0/	011101 0100	100010 1011	S	−	+	−	0	−	−	−
2	000 00101	05	/D5.0/	101001 1011	101001 0100	F	−	+	+		−	+	+
3	000 11010	1A	/D26.0/	010110 1011	010110 0100	F	+	−	−	1	+	+	+
4	000 01111	0F	/D15.0/	010111 0100	101000 1011	S	−	+	−		+	−	+
5	100 11101	9D	/D29.4/	101110 0010	010001 1101	S	−	+	−	0	+	−	+
6	011 11111	7F	/D31.3/	101011 0011	010100 1100	F	−	+	+		+	−	−
7	101 01111	AF	/D15.5/	010111 1010	101000 1010	F	+	−	−	0	−	−	−
8	110 11000	D8	/D24.6/	110011 0110	001100 0110	F	−	+	+		−	+	+
9	001 11111	3F	/D31.1/	101011 1001	010100 1001	F	+	−	−	1	+	+	+
10	111 11110	FE	/D30.7/	011110 0001	100001 1110	S	−	+	−		+	−	+
11	001 00111	27	/D7.1/	111000 1001	000111 1001	S	−	+	−	0	+	−	+
12	001 01111	2F	/D15.1/	010111 1001	101000 1001	F	−	+	+		+	−	−
13	000 10110	16	/D22.0/	011010 1011	011010 0100	F	+	−	−	1	−	+	+

FIG. 7

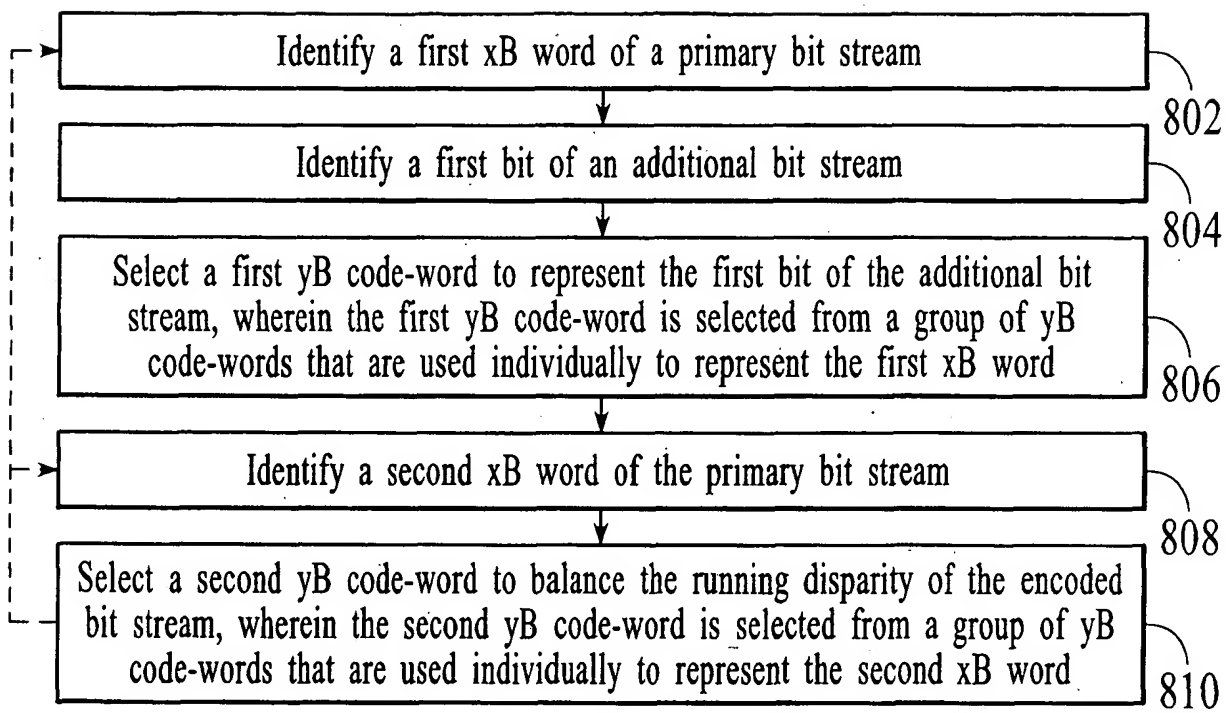

Identify a first xB word of a primary bit stream
802
Identify a first bit of an additional bit stream
804
Select a first yB code-word to represent the first bit of the additional bit stream, wherein the first yB code-word is selected from a group of yB code-words that are used individually to represent the first xB word
806
Identify a second xB word of the primary bit stream
808
Select a second yB code-word to balance the running disparity of the encoded bit stream, wherein the second yB code-word is selected from a group of yB code-words that are used individually to represent the second xB word
810

FIG. 8

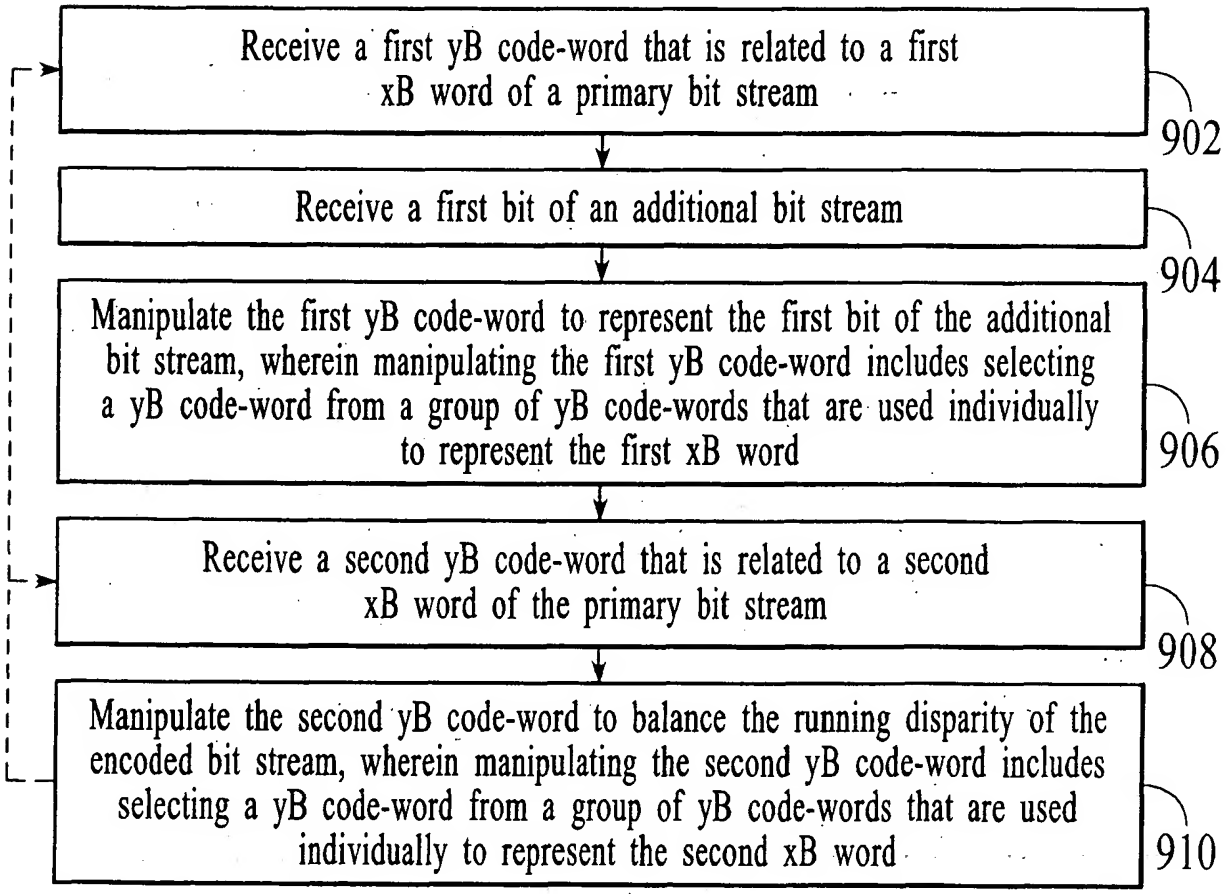

Receive a first yB code-word that is related to a first xB word of a primary bit stream
902
Receive a first bit of an additional bit stream
904
Manipulate the first yB code-word to represent the first bit of the additional bit stream, wherein manipulating the first yB code-word includes selecting a yB code-word from a group of yB code-words that are used individually to represent the first xB word
906
Receive a second yB code-word that is related to a second xB word of the primary bit stream
908
Manipulate the second yB code-word to balance the running disparity of the encoded bit stream, wherein manipulating the second yB code-word includes selecting a yB code-word from a group of yB code-words that are used individually to represent the second xB word
910

FIG. 9

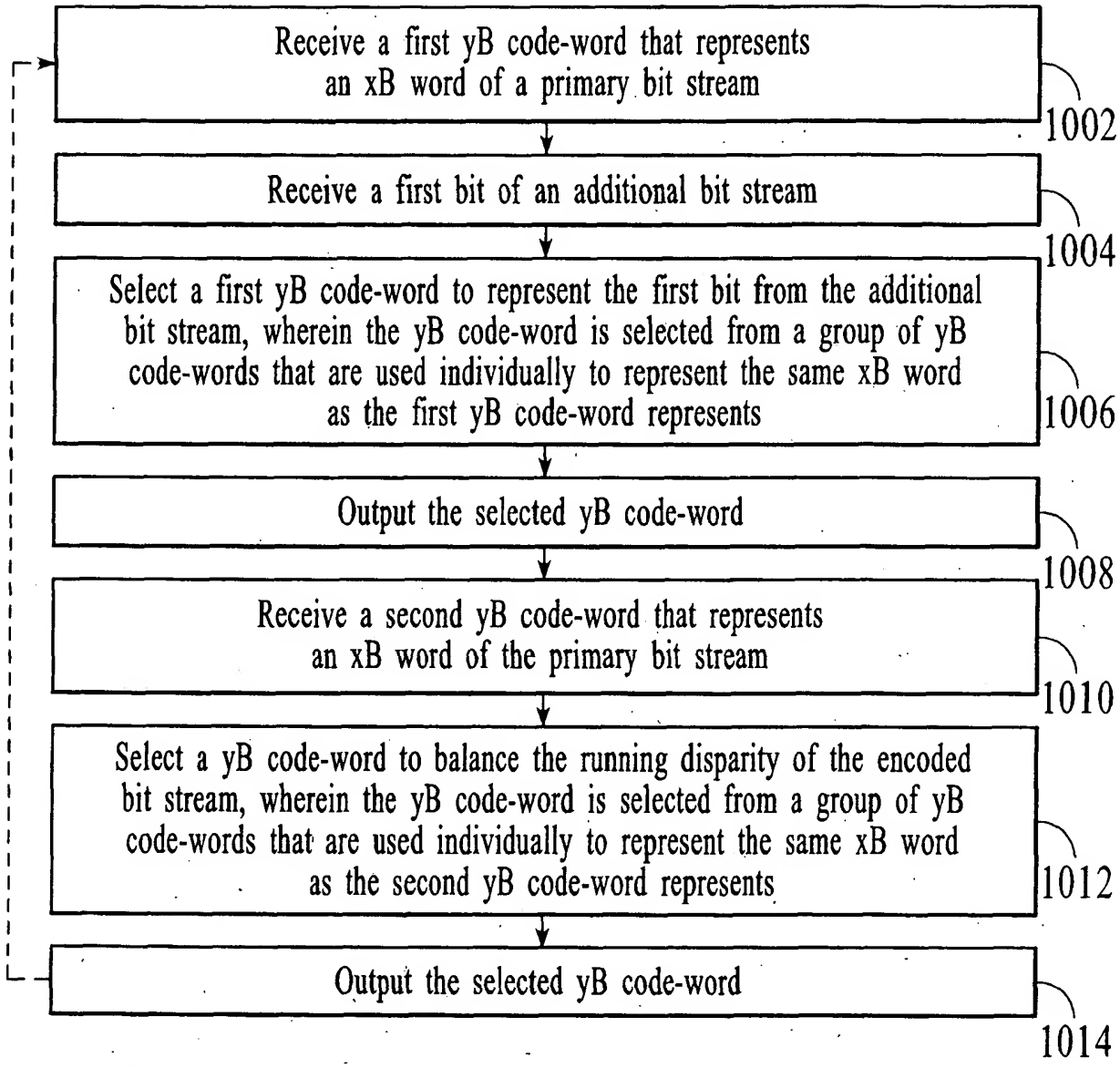

Receive a first yB code-word that represents an xB word of a primary bit stream
1002
Receive a first bit of an additional bit stream
1004
Select a first yB code-word to represent the first bit from the additional bit stream, wherein the yB code-word is selected from a group of yB code-words that are used individually to represent the same xB word as the first yB code-word represents
1006
Output the selected yB code-word
1008
Receive a second yB code-word that represents an xB word of the primary bit stream
1010
Select a yB code-word to balance the running disparity of the encoded bit stream, wherein the yB code-word is selected from a group of yB code-words that are used individually to represent the same xB word as the second yB code-word represents
1012
Output the selected yB code-word
1014

FIG. 10

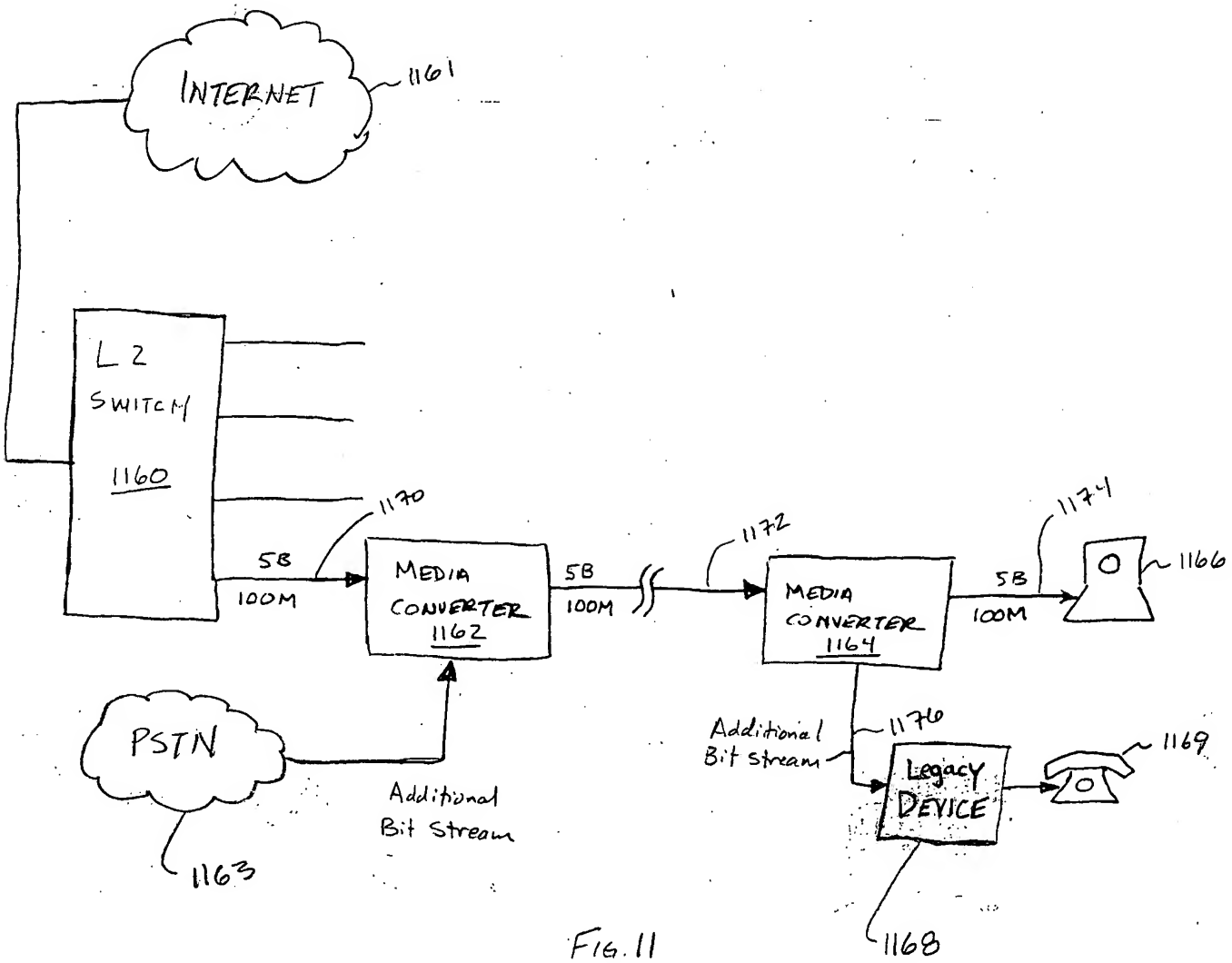

INTERNET
1161
L 2
SWITCH
1160
1170
5B
100M
MEDIA
CONVERTER
1162
5B
100M
1172
MEDIA
CONVERTER
1164
5B
100M
1174
1166
PSTN
1163
Additional
Bit Stream
Additional
Bit Stream
1176
Legacy
DEVICE
1169
1168

FIG. 11

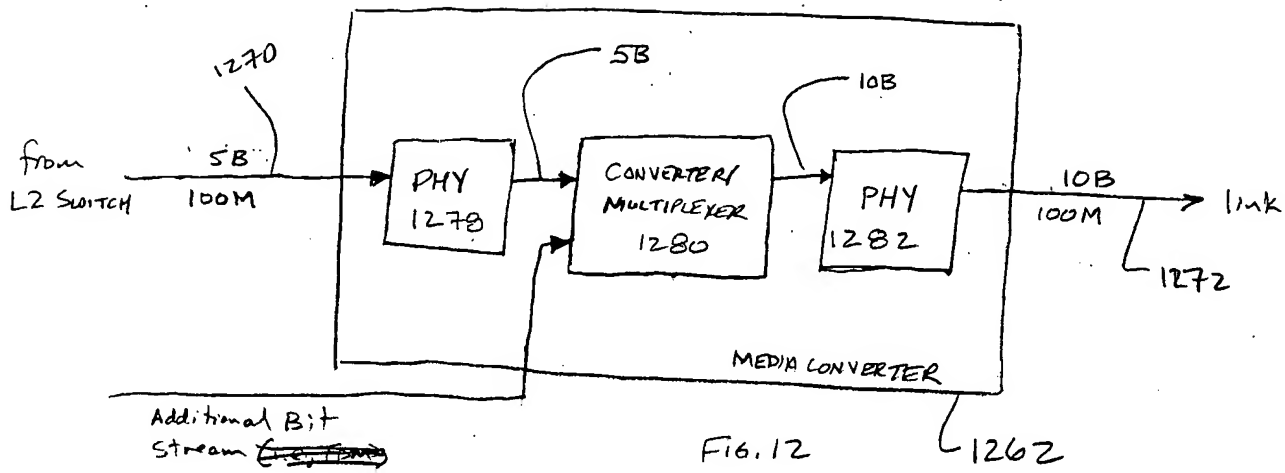

1270
5B
10B
from
L2 Switch
5B
100M
PHY
1278
Converter/
Multiplexer
1280
PHY
1282
10B
100M
link
1272
Media Converter
Additional Bit
Stream
1262

Fig. 12

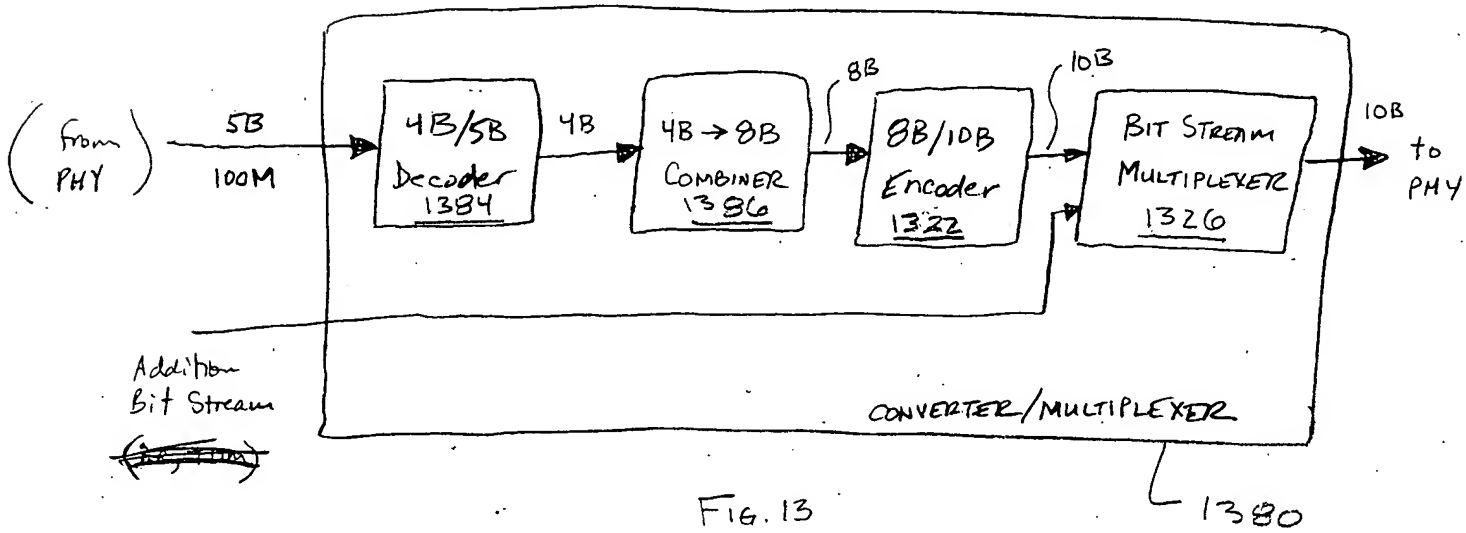

From
PHY
5B
100M
4B/5B
Decoder
1384
4B
4B → 8B
Combiner
1386
8B
8B/10B
Encoder
1322
10B
Bit Stream
Multiplexer
1326
10B
to
PHY
Addition
Bit Stream
Converter/Multiplexer
1380

Fig. 13

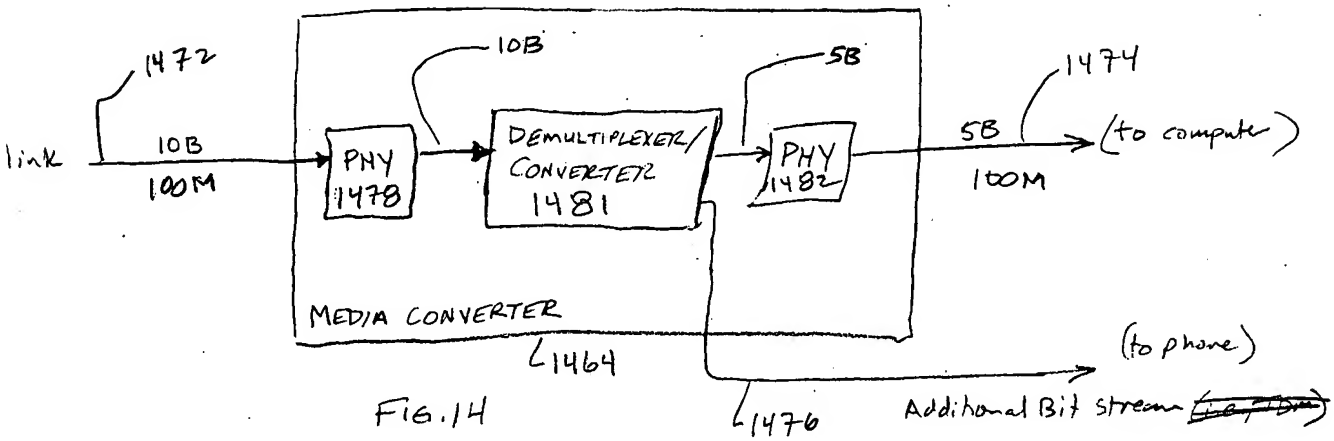

1472
10B
link
10B
100M
PHY
1478
10B
DEMULTIPLEXER/
CONVERTER
1481
5B
PHY
1482
1474
5B
100M
(to computer)
MEDIA CONVERTER
1464
(to phone)
1476
Additional Bit stream

FIG. 14

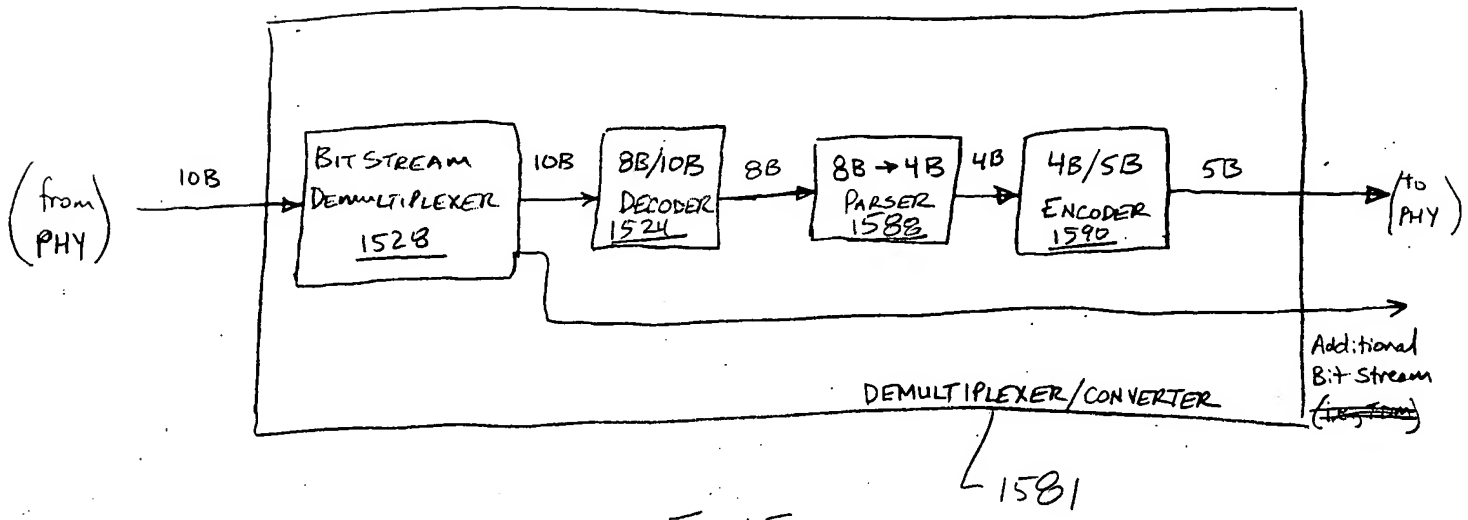

(from PHY)
10B
BIT STREAM
DEMULTIPLEXER
1528
10B
8B/10B
DECODER
1524
8B
8B→4B
PARSER
1588
4B
4B/5B
ENCODER
1590
5B
(to PHY)
Additional
Bit Stream
DEMULTIPLEXER/CONVERTER
1581

FIG. 15

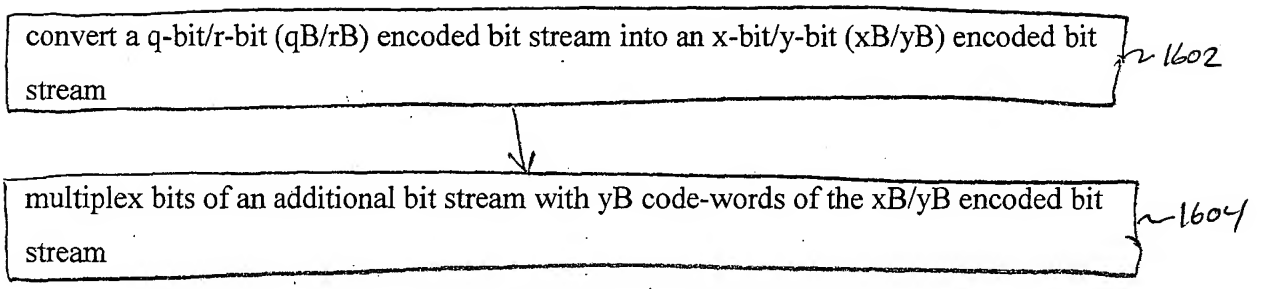

convert a q-bit/r-bit (qB/rB) encoded bit stream into an x-bit/y-bit (xB/yB) encoded bit stream
1602
multiplex bits of an additional bit stream with yB code-words of the xB/yB encoded bit stream
1604

Fig. 16

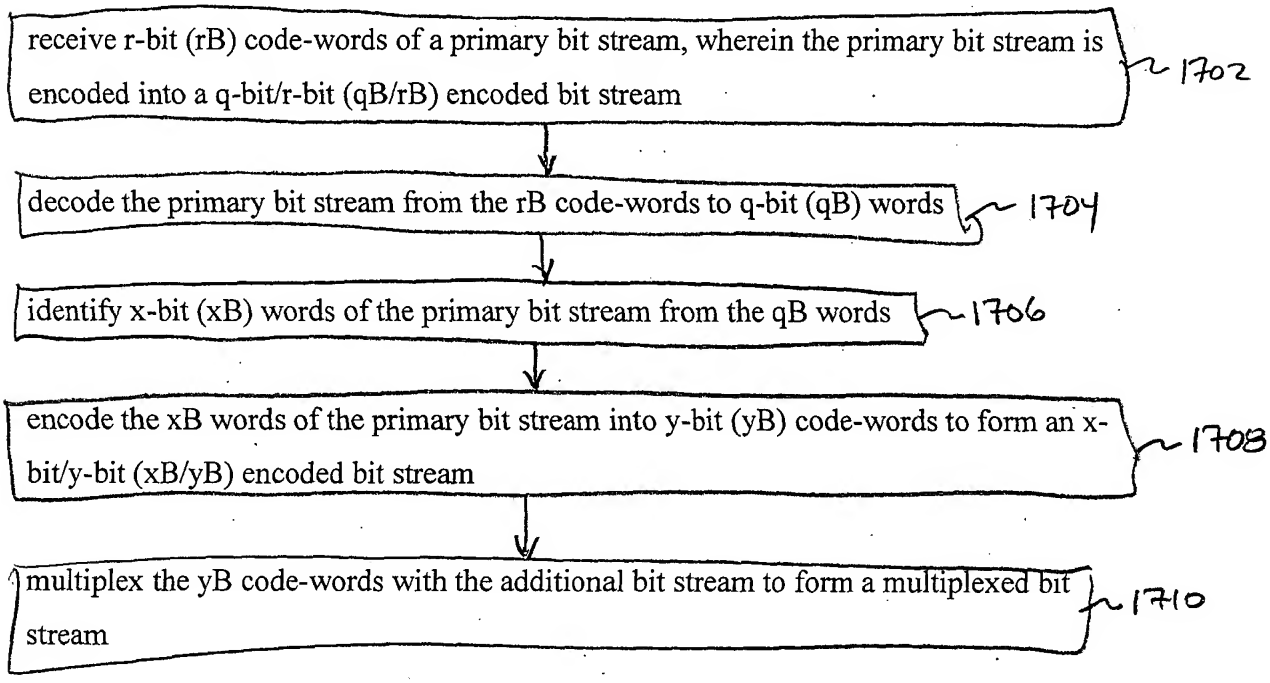

receive r-bit (rB) code-words of a primary bit stream, wherein the primary bit stream is encoded into a q-bit/r-bit (qB/rB) encoded bit stream
1702
decode the primary bit stream from the rB code-words to q-bit (qB) words
1704
identify x-bit (xB) words of the primary bit stream from the qB words
1706
encode the xB words of the primary bit stream into y-bit (yB) code-words to form an x-bit/y-bit (xB/yB) encoded bit stream
1708
multiplex the yB code-words with the additional bit stream to form a multiplexed bit stream
1710

Fig. 17

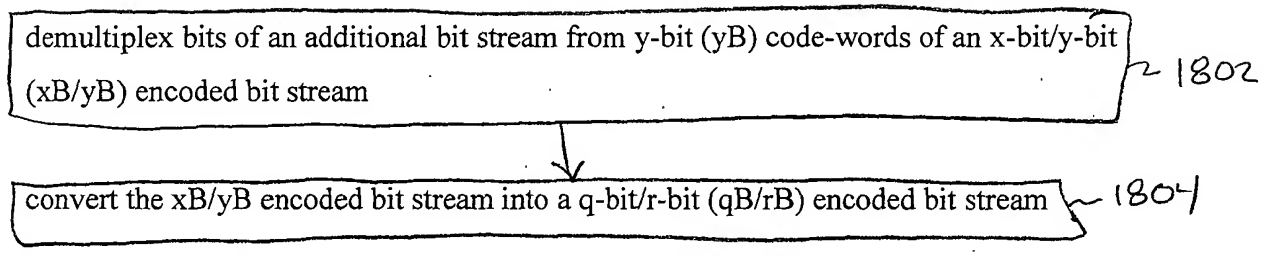

demultiplex bits of an additional bit stream from y-bit (yB) code-words of an x-bit/y-bit (xB/yB) encoded bit stream
1802
convert the xB/yB encoded bit stream into a q-bit/r-bit (qB/rB) encoded bit stream
1804

FIG. 18

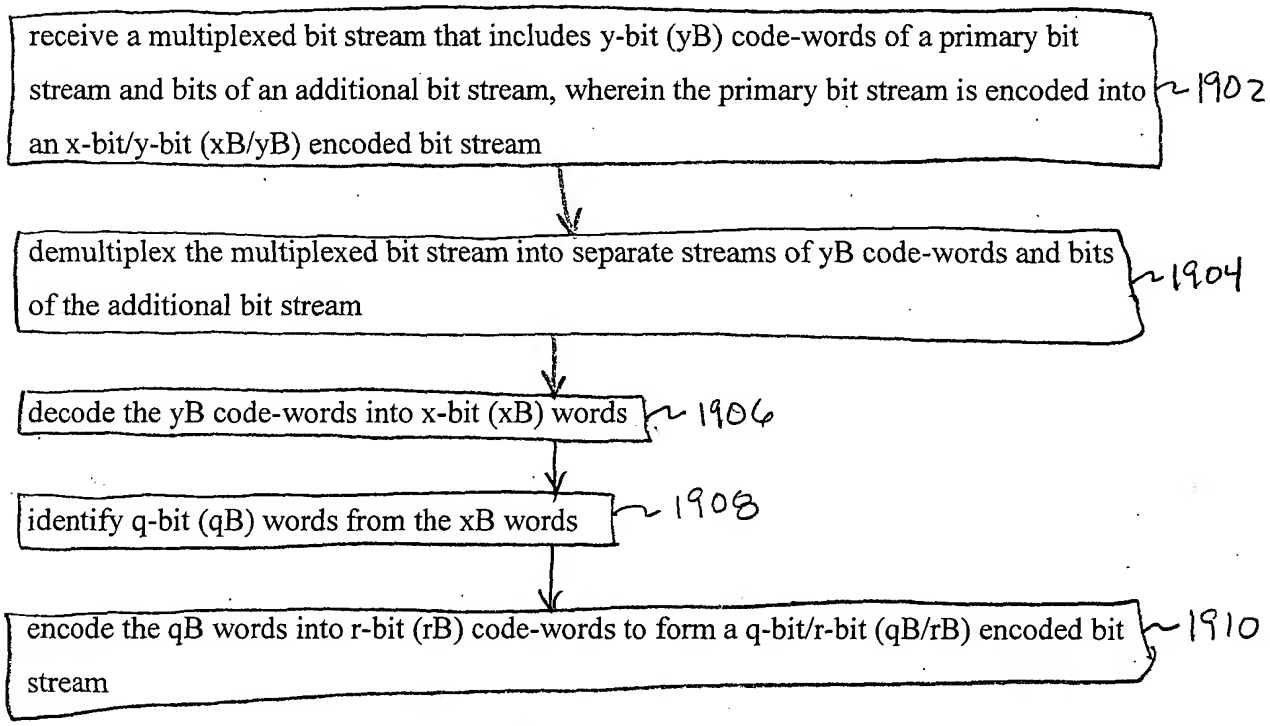

receive a multiplexed bit stream that includes y-bit (yB) code-words of a primary bit stream and bits of an additional bit stream, wherein the primary bit stream is encoded into an x-bit/y-bit (xB/yB) encoded bit stream
1902
demultiplex the multiplexed bit stream into separate streams of yB code-words and bits of the additional bit stream
1904
decode the yB code-words into x-bit (xB) words
1906
identify q-bit (qB) words from the xB words
1908
encode the qB words into r-bit (rB) code-words to form a q-bit/r-bit (qB/rB) encoded bit stream
1910

FIG. 19